

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

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Ex parte ICHIRO KASAI, YASUSHI TANIJIRI  
and HIDEKI NAGATA

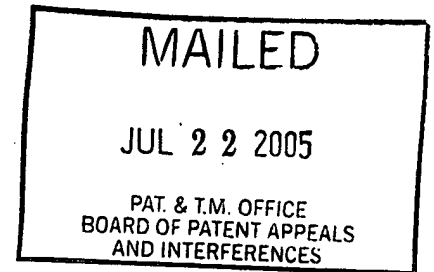
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Appeal No. 2005-1704  
Application No. 09/615,233

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ON BRIEF

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Before THOMAS, KRASS, and RUGGIERO, Administrative Patent Judges.  
KRASS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1 and 3-13.

The invention is directed to a head-mounted display apparatus which reduces the load on a user's head by having the screen close to the user's head, thus reducing the overall mass moment of the apparatus.

Representative independent claim 1 is reproduced as follows:

1. A head-mounted image display apparatus comprising:
  - an image display element;
  - a projection optical system that projects an image displayed by said image display element;
  - a screen on which the image projected by said projection optical system is formed; and
  - a combiner disposed between said projection optical system and said screen, wherein said combiner transmits image light from said projection optical system and directs it to said screen, and reflects the image light reflected at the screen while simultaneously transmitting external light.

The examiner relies on the following references:

Suzuki et al. (Suzuki)	5,537,092	Jul. 16, 1996
Okamura	5,601,352	Feb. 11, 1997
Travers et al. (Travers)	6,150,998	Nov. 21, 2000 (filed Aug. 11, 1997)
Hanano	6,185,045	Feb. 6, 2001 (filed Jun. 5, 1998)

Claims 1, 3, and 7-12 stand rejected under 35 U.S.C. §102 (b) as anticipated by Okamura.

Claims 4-6 and 13 stand rejected under 35 U.S.C. §103. As evidence of obviousness, the examiner offers Okamura and Hanano with regard to claims 4-6, adding Travers and Suzuki to this combination with regard to claim 13.

Reference is made to the briefs and answer for the respective positions of appellants and the examiner.

### OPINION

Turning, first, to the rejection under 35 U.S.C. §102 (b), a rejection for anticipation requires that the four corners of a single prior art document describe every element of the claimed invention, either expressly or inherently, such that a person of ordinary skill in the art could practice the invention without undue experimentation. In re Paulsen, 30 F.3d 1475, 1478-79, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994).

With regard to independent claims 1 and 11, the examiner asserts that Okamura teaches a head-mounted image display apparatus comprising an image display element (Figure 4, elements 3-5), a projection optical system that projects an image displayed by the image display element (Figure 4, elements 6 and 14), a screen on which the image projected is formed (Figure 4, element 7) and a combiner disposed

between the projection optical system and the screen (Figure 4, element 15), wherein the combiner transmits image light and directs it to the screen, and reflects the image light reflected at the screen (Figure 4, element 15), while simultaneously transmitting external light (Column 6, lines 42-60). Thus, the examiner finds the half mirror of Okamura to be a combiner, and the reflective mirror 7 to be a screen.

Appellants argue that the diffusing plate 6 of Okamura is not a “projecting” element, as claimed, because the diffusing plate 6 diffuses the light, scattering it in many directions. They assert that because the diffusing plate 6 scatters the light transmitted therethrough, the plate cannot form the image on the ocular lens 7. They explain that light from a single point in an image plane that strikes a subsequent surface at a plurality of locations is not the same image, whereas instant claim 1 requires a projection optical system to project an image displayed by an image display element onto a screen such that the same image is formed on a screen.

We have reviewed the evidence before us, including the arguments of appellants and the examiner, and we conclude therefrom that the examiner has established a prima facie case of anticipation which has not been successfully overcome by appellants’ arguments.

We cannot agree with appellants' very limiting interpretation of the term "projecting." Clearly, the image in Okamura is "projected" on the screen (element 7 in Figure 4). In fact, even the abstract of Okamura describes "a projection optical system for projecting an image displayed on the image display means onto eyes of a viewer." From Figure 4 of Okamura, it is seen that a light source 1 sends light through a collimator lens 2 and LCD elements (image display elements) 3, 4, and 5, and then through diffusing plate 6, the combination of these elements "projecting" the light through half mirror ( or combiner) 15 to a screen (concave mirror 7) which then reflects the light back through the half mirror to the viewer's eyes. Thus, even though diffusing plate 6 may diffuse the light, the light is still "projected" to the screen element 7. Since the reflected light is indicative of the image projected, we fail to see why the image projected is not the same image formed on the screen 7, and then reflected back to the viewer.

Since we find the examiner's case persuasive and appellants' arguments unconvincing, we will sustain the rejection of claims 1 and 11, and of claims 3, 7-10, and 12, which depend therefrom, under 35 U.S.C. §102 (b).

Turning to the rejection of claims 4-6 under 35 U.S.C. §103, the examiner contends that while Okamura is silent as to the apparatus further comprising an

eyepiece optical system disposed between the combiner and the user, wherein the eyepiece optical system enlarges the projected image onto the screen, and as to an optical element disposed on an external side of the combiner in combination with such an eyepiece optical system, Hanano teaches such an eyepiece at Figure 9, at element 13, and Okamura teaches such an external optical element at Figure 4, element 16.

It is the examiner's position that the common ownership of the Okamura and Hanano patents and the common subject matter of a head-mounted image display apparatus would have made the use of the various disclosed features in one system interchangeable with the elements of the other system, "wherein the eyepiece of Hanano could be added to the head mounted image display apparatus of Okamura to enhanced [sic, enhance] the system based on known features on a like device..." (answer-page 6).

The examiner also contends, re the limitations of claim 6, that "viewing the computer generated video superimposed onto the real world environment, said system inherently has an optical power close to zero, for the purpose of having no strain on the eye while viewing real and generated images simultaneously" (answer-page 6, emphasis added).

Appellants argue that Hanano's projection lens 5' cannot be combined with Okamura because there is no suggestion to replace Okamura's diffusion plate 6 with Hanano's projection lens 5'. Further, appellants assert, there is no disclosure that the composite optical power of Hanano's trapezoidal optical element 13 and shutter 16 of Okamura is substantially zero, as claimed. In fact, argue appellants, since Hanano's optical element 13 is stated to allow refracting power to increase at a peripheral portion of the optical element 13, at column 31, lines 24-25, this is indicative of optical element 13 having some optical power and, since shutter 16 of Okamura would have to counteract the power of Hanano's element 13 in order to result in a substantially zero composite optical power, the examiner's reasoning is faulty. This is so, argue appellants, because shutter 16 has no optical power.

We do not agree with appellants' argument re non-combinability since the argument appears to be based on an assumption of not being able to physically substitute one element for another. The test of obviousness is not whether features of a secondary reference may be bodily incorporated into a primary reference's structure, nor whether the claimed invention is expressly suggested in any one or all of references; rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. One cannot show nonobviousness by attacking references individually where the rejection is based on a combination of

references. It is not necessary that the device shown in one reference can be physically inserted into device shown in other reference to justify combining their teachings in support of rejection. In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Here, the examiner's view that the various features of one reference are combinable with features of the other reference since they both deal with head-mounted image display devices having similar and common elements, appears reasonable to us and appellants have not persuaded us of non-combinability merely because there is no express suggestion in either one of the references for making the combination. Accordingly, we will sustain the rejection of claims 4 and 5 under 35 U.S.C. §103 since Hanano teaches the claimed eyepiece optical system for enlarging the projected image, and Okamura teaches an optical element (shutter) disposed on the external side of the combiner. Moreover, we note that appellants do not specifically, separately, argue the limitations of these claims

However, we do not agree with the examiner as to the issue regarding a substantially zero optical power. Contrary to the examiner's position, there is no indication that the use of Hanano's optical element 13, between the eye and the combiner (in Okamura's Figure 4 embodiment), and Okamura's shutter would result in a



structure wherein a composite optical power of the eyepiece optical system and the optical element (Okamura's shutter) is "substantially zero."

Appellants provide no special definition of the term "optical power" and none is argued, but it appears reasonable to us to assume that "optical power" relates at least to the magnification of an optical instrument. The examiner offers the explanation that since images or light can be seen through the optical system of the combined Okamura/Hanano device with no additional optical power (the examiner states that "in optics parallel light is said to have zero optical power" - answer, page 11), such an image superimposed onto the real world "inherently has an optical power substantially zero" (answer-page 11). We don't follow the examiner's logic. Even if parallel light may be said to have "zero optical power," the light going through Hanano's trapezoidal optical element 13 appear to be refracted, in accordance with column 31, lines 24-25. Therefore, there appears to be some "optical power" generated by Hanano's optical element 13. But if this is combined with Okamura's shutter, which offers no magnification, and hence no optical power, the combination of optical element 13 and Okamura's shutter cannot result in "a composite optical power" of "substantially zero," as claimed.

The examiner answers appellants' argument that the shutter/trapezoidal element combination does not offer a substantially zero optical power, by pointing out that shutter 16 of Okamura has zero optical power because it merely serves to let in external light to be viewed simultaneously with the computer image. Therefore, concludes the examiner, its addition or combination with optical element 13 of Hanano had an inconsequential effect on optical power. The examiner further points out that the optical element 13 of Hanano will be distributing parallel light, which is "known to have zero power" (answer-page 11).

But if the examiner acknowledges that shutter 16 offers no "optical power," and that its addition to optical element 13 of Hanano has an "inconsequential effect" on optical power, we find the examiner's conclusion that the combination offers "substantially zero" optical power to be faulty. How can one add something that generates no optical power to an element which offers optical power and result in a combination of "substantially zero" optical power? The conclusion, in our view, is illogical. Therefore, we will not sustain the rejection of claim 6 under 35 U.S.C. §103.

Turning, finally, to the rejection of independent claim 13 under 35 U.S.C. §103, the examiner adds Travers to the combination of Okamura and Hanano for the teaching of a headset for the purpose of visual display that would have been readily available to

the artisan for use in head mounted display devices. Since the combination of these three references still lacks an image display being placed closer to a first rotatable end, the examiner turns to Suzuki to show that it would have been an obvious design choice to place the image display below eye level, making it closer to the second end. The examiner specifically points to Suzuki's Figures 3, 7, and 8. The examiner concludes that it would have been obvious to combine the hood features of Travers and Suzuki with the head-mounted display optical system of Okamura and Hanano for the purpose of achieving an enhanced display, "because both Travers and Suzuki suggest said features are useful in such systems" (answer-page 8).

For their part, appellants do not argue the helmet structure components of Travers and Suzuki. Instead, appellants rely on the arguments supra, regarding a perceived lack of a projection optical system and a composite optical power of zero in the primary references, adding that neither Travers nor Suzuki provide for these deficiencies.

We do not find persuasive appellants' arguments pertaining to a lack of a projection optical system in Okamura, for the reasons supra. However, we are persuaded, for the reasons supra, by the argument anent the composite optical power

of substantially zero. Accordingly, we will not sustain the examiner's rejection of claim 13 under 35 U.S.C. §103.

We have sustained the rejection of claims 1, 3, and 7-12 under 35 U.S.C. §102 (b), as well as the rejections of claims 4 and 5 under 35 U.S.C. §103. We have not, however, sustained the rejections of claims 6 and 13 under 35 U.S.C. §103.

Accordingly, the examiner's decision is affirmed-in-part.

AFFIRMED-IN-PART

BOARD OF PATENT  
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Appeal No. 2005-1704  
Application No. 09/615,233

Page 14

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